Abstract

The world was changed after the Industrial Revolution, which took place from the 18th to 19th centuries. It bought with it many things which human beings had never seen before. The industrial revolution also led to increase in heavy transport vehicles. Due to the boom humans along with other natural species experienced disturbing noise which they had never felt before. It also changed their lives. Nowadays pollution caused by sounds has become a major issue after air and water pollution. Noise has a harmful physiological and psychological effect on a human being and also on the environment. Noise causes adverse health effects like hearing loss, disturbance in the sleep pattern, reduce working efficiency, cardiovascular problems, and also affects the social behaviour of human beings. The impact of noise pollution on human beings and the environment is a matter of concern. Scientists and researchers of various disciplines have made considerable efforts to reduce noise pollution. Acoustic material plays a vital role in controlling the industrial noise, traffic noise, office noise, noise at public places, and noise at home. Textile is one of the best materials used to reduce the noise because of its added advantages like lightweight and low cost. The conventional materials like glass and rock wool used for sound absorption are non-biodegradable. Many currently used acoustic materials are harmful to human health and not eco-friendly. This is where unconventional natural fibre finds relevance due to their properties like low cost, low weight, renewable, biodegradable nature, and unique structural properties making them an attractive choice for Acoustic application. Due to an increase in environmental consciousness, researchers are attempting to develop eco-friendly and green material products. This research, is an effort to study the acoustic properties of eco-friendly sound-absorbing needle punch nonwoven fabric developed by using eco-friendly natural fibres like Kapok and Estabragh (Milkweed) for acoustic application. The design of the experiments is planned as per Response surface methodology - Central composite design (RSM-CCD) methods using Minitab 18 software in this research

work. A total of sixty-two samples were produced by varying kapok or milkweed fibre proportion in the blend %, carded web mass, needle stroke frequency, needle penetration depth. Physical properties of developed samples like fabric thickness, fabric GSM, porosity, and air permeability measured using standard testing methods. Acoustic properties of developed samples are measured by measuring the sound absorption coefficient using impedance tube test methods for different frequencies (250 Hz to 6300 Hz) of the incident sound. This research, the study of acoustic properties of estabragh (milkweed) and kapok fibre indicates that there is a huge potential for kapok and milkweed fibre to be used for acoustic application as a sustainable material.